

Land Use/Land Cover Change Detection using Geoinformatics in Gurugram District, Haryana, India



Anuj Goyal, Mukta Sharma, Dapinder Deep Singh

ABSTRACT: *The district Gurugram in the state Haryana has seen significant extension & development during the last few years. In this paper, the change in land-use/cover has been estimated with time range of 2007 - 2017 and the change detection was quantified. The land-use/cover data generated through satellite imagery has been classified into five major classes i.e., (i) Built-up land (ii) Water Bodies (iii) Barren Land (iv) Agricultural Land (v) Vegetation. The investigation was helped out through Geoinformatics approach by using IRS-P6-LISS-III sensor of 2007 and IRS-P6-LISS-IV sensor of 2017. Observing of land-use/spread mirrored that changes were more noteworthy in degree over the time range of 10 years in the land under various classes. The most sensational changes are the increase in built-up land and barren land. Apart from this decrease in agricultural, water bodies and vegetation cover area also. Results demonstrates an expansive change in the territory of various land use classifications amid the period from 2007 to 2017. The agriculture land covering an area of about 55.27% in 2007 reduced to 43.42% in 2017. The built up area increased from 15.97 % in 2007 to 30.23 in 2017. The barren land area increased from 6.45 % in 2007 to 16.97 in 2017. The Water bodies decreased from 4.65 % in 2007 to 1.05 % in 2017. The vegetation area has also decreased from 17.66 % in 2007 to 8.33 % in 2017. Urban extension and various anthropogenic exercises have brought genuine misfortunes of agricultural land, vegetation and water bodies.*

Keywords: *Change detection, GIS, Landuse/Land cover, LISS-III, LISS-IV, Remote sensing.*

I. INTRODUCTION

In the present time, the changing pattern of Land use/Land spread and especially settlement development in the territory requires an all the more dominant and advanced framework, for example, GIS and Remote Sensing information which gives a general broad concise inclusion of expansive regions than airborne photography. Thusly, try will be made in this examination to layout the status of land use land front of Gurugram district and recognizing the land usage rate and the movements that has happened in this status particularly in the created land so as to envision possible changes that may occur in this status in the coming years.

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Information around land use/land spread and possible results for their optimal use is essential for the decision, masterminding and execution of land use intends to satisfy the growing requirements for principal human needs and welfare.

Remote Sensing and Geographic Information System techniques have become the new tools for checking land use changes. Gurugram district in the Haryana which is also a part of NCR has broadened national attestation over the most recent couple of years because of quickly developing administration segment. This is one of the essential elements for choosing Gurugram for this contextual investigation. This present examination has been under taken with an objective to make spatial database of Land Use/land spread for the year 2007 to 2017.

II. AIM & OBJECTIVES

The point of this examination is to deliver a land use/land spread guide of Gurugram area so as to recognize the progressions that have occurred over a given period utilizing change recognition strategy. The accompanying overwhelming destinations are searched out so as to accomplish the following points:-

- The fundamental target of the present paper is to seclude nature and measurement of land use changes in parts of Gurugram district of Haryana in the past 10 years.
- To determine the aerial change of land use/land cover data
- To investigate the nature, rate, zone and level of land use/land cover change for the period 2007 to 2017

III. STUDY AREA

The Gurugram District is one of the southern districts of Haryana. The district, Gurugram, lies at 27° 39' and 28° 32' 25" North latitudes and 76° 39' 30" and 77° 20' 45" East longitudes. The total area of Gurugram District is 1187.40sq.km (Fig.1). The climate of Gurugram is semi-arid which is mainly dry with hot summer and cold winter. The area has flat topography except in the north-eastern and southern parts having hills of Pre-Cambrian age of Delhi Super Group.



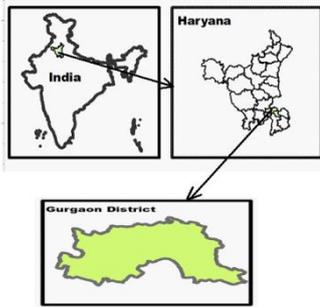


Fig.1: Location Map of Study Area

IV. METHODOLOGY

Land use/land spread order and mapping of the examination territory was completed utilizing LISS-III sensor at a resolution of 23 m for the time of 2007 and LISS-IV sensor at a resolution of 5.8 m for the year 2017. The satellite data covering study area were obtained from NRSC Hyderabad. Auxiliary information from Survey of India (SOI) toposheets on 1:50,000 scales covering the whole examination territory were also utilized to prepare base maps. The land use/cover classes from the different satellite images were generated by Supervised Image Classification technique by using remote sensing & GIS software's. A field visit was undertaken to carry out systematic verification of the interpretation of selected images, perform updating of the land use/ land cover status observed during field visit and to collect ground truth data using GPS. For identify the changing pattern of land use/cover of the study area during 2007-2017 land use change statistics was generated. The percentage change was also determined for the given period.

V. RESULT & DISCUSSION

The general land use of an area depicts an idea of overall areal utilization of resources, natural or cultural. In this paper, differences in the land use and land cover of Gurugram region are assessed from the contrasts between ten years of period (2007-2017) in fig. 2 and fig. 3. The discoveries of the present examination are displayed in table I. The agriculture land covering an area of about 55.27% reduced to 43.42%. The built up area increased from 15.97 % to 30.23. The barren land area increased from 6.45 % to 16.97. The Water bodies decreased from 4.65 % to 1.05 %. The vegetation area has also decreased from 17.66 % to 8.33 %. Built-up land and Barren land class is appearing expanding pattern and in this manner coming about to the deduction that the population weight is assuming an extremely dynamic job towards reducing Agricultural spread. Henceforth, it is imperative to eagerly screen the land use and land cover changes for keeping up a pragmatic space for an authentic progression

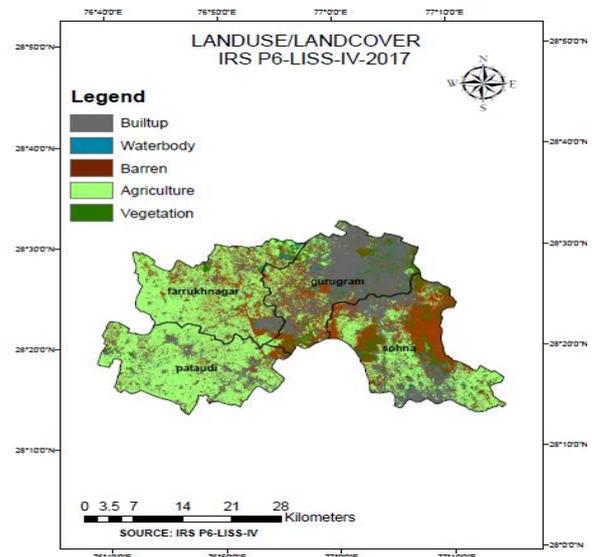


Fig. 2 Land use / Land cover map 2007

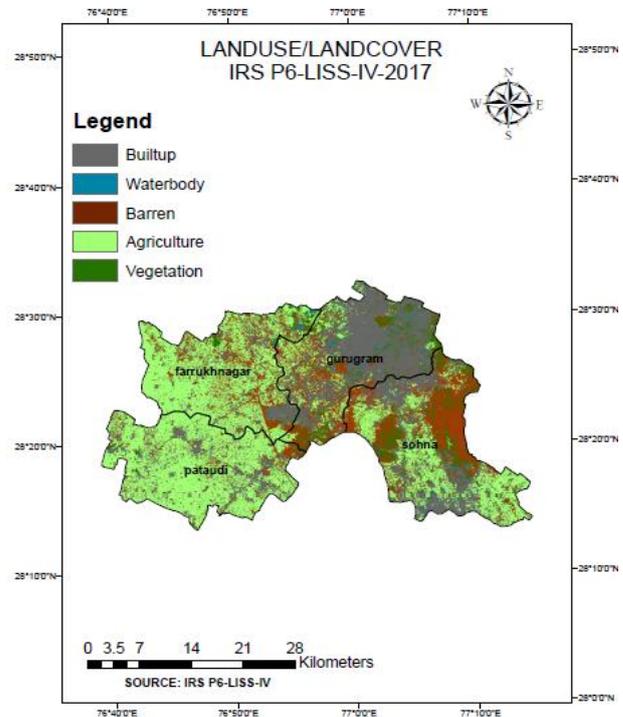


Fig. 3 Land use / Land cover map 2017

Table- I. Land use / Land cover change analysis, 2007-2017

Land use/Land cover Class	Area	%	Area	%	Change Rate (2007-2017) in Sq. km
	(sq.km)	Area(sq.km)	(sq.km)	-2017	
	2007	-2007	2017		
Built-up	189.67	15.97	358.9	30.23	169.23

Water body	55.25	4.65	12.43	1.05	-42.82
Barren	76.61	6.45	201.56	16.97	124.95
Agriculture	656.23	55.27	515.59	43.42	-140.64
Vegetation	209.64	17.66	98.92	8.33	-110.72
Total	1187.4	100%	1187.4	100%	

VI. CONCLUSION

The examination was completed in the Gurugram area. Studies on changing the pattern of land use/ land cover have revealed that significant changes have taken place over the decade from 2007-2017 of Gurugram district. The agriculture land covering an area of about 656.23 sq.km in 2007 reduced to 515.59 sq.km in 2017 (Table-I). The built up area increased from 189.67 sq.km in 2007 to 358.90 sq.km in 2017(Table-I). The barren land area increased from 76.61 sq.km in 2007 to 201.56 sq.km in 2017(Table-I). The Water bodies decreased from 55.25 sq.km in 2007 to 12.43 sq.km in 2017(Table-I). The vegetation area has also decreased from 209.64 sq.km in 2007 to 98.92 sq.km in 2017(Table-I).The finding of the present study shows that that there is remarkable increase in built up and barren land of the study area due to the influence of human activities on the natural resource of the area. The reason for a decrease in agricultural land between 2007 to 2017 is related with increment in neglected land between the timeframes. The water bodies have additionally been exhausting at quicker rate which involves extraordinary concern. In any case, these patterns should be intently checked for the manageability of condition in future.

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